to do much damage throughout this entire region, but that the greatest destruction occurred about 4 miles east of Clearmont, over a region of about 4 square miles, as indicated on the accompanying map. Mr. Brink states that at one point in this region the fall of hail was so heavy that a drift unprotected by any artificial means remained lying on the ground for four weeks after the storm, and this too at a season of the year when the soil had a comparatively high temperature. Mr. Brink, leaving Marysville, visited the region where the storm occurred, just four weeks after September 5, and secured several excellent photographs of the scene. Even at that time he found the people of the neighborhood gathering the hail for the purpose of making ice cream. Pieces of ice had been picked up at the time of the storm of a cylindrical form of about four inches long by about two and a half in diameter. We reproduce on Chart XVI, Fig. *a*, a photograph showing how complete had been the destruction of growing corn. The stalk seen in the photograph was quite mature, and is the only one left standing in a field of 80 acres. Had it not been for the hailstorm, this field would have yielded 60 bushels to the acre when harvested in the middle of September. The half tone, Chart XVI, Fig. *b*, shows the complete destruction of the foliage in a grove of young trees. Of course, the falling cakes of ice destroyed the roofs and even the sides of the houses, sometimes the north and sometimes the north and west sides at Clearmont; when its force was not sufficient to make a fresh hole through the boarding, the hail would generally, at least knock out the knot holes. The northern edge of the storm seems to have passed about ten miles north of Maryville; but 2 or 3 miles farther north a narrow strip of country also suffered severely; see Chart XVI. The statement that in some places the earth was covered to the depth of a foot, while everywhere it was white with ice, seems to justify the conclusion that there must have been an average depth of from 4 to 6 inches over the central region of, at least, 4 square miles in area.

THE TELEGRAPH SERVICE WITH THE WEST INDIES.

By J. H. Robinson, Chief of Division.

Daily telegraphic weather reports from the West Indies, Central and South America, and the Mexican Gulf Coast are now received at the Central Office of the Weather Bureau, i. e., from Nassau, Habana, Santiago de Cuba, Kingston, Santo Domingo, San Juan, St. Thomas, St. Kitts, Dominica, Martinique, Barbados, Trinidad, Curaçoa, Colon, Coatzacoalcos Vera Cruz, Tampico, and from Merida when the conditions are threatening. Daily reports are also received from Bermuda. For details as to routes of submarine cables over which reports are transmitted, see Chart XIII, showing points at which the cables connect with the land lines.

During the entire duration of the recent war with Spain daily weather reports were regularly received at the Central Office of the Weather Bureau from Habana. The observations were taken by the observers of the Spanish Meteorological Service for the Antilles, and were telegraphed by their operators to Key West, where they were retelegraphed to Washington. The submarine cable from Key West to Habana remained intact during the entire war, as did also the cable from Santiago de Cuba to Kingston, Jamaica. As the Key West–Habana cable had its outlet through the United States, it was not deemed wise to disturb it; the Santiago de Cuba–Jamaica cable, however, was grappled for, but not caught.

In connection with this article, perhaps it would be of interest to know that the Weather Bureau observers on the seacoast in many instances rendered efficient service to their country by reporting passing vessels, one of the most important being the arrival of the *Oregon* off Jupiter, Fla.

WEATHER TYPES AT HAVRE, MONT.

By C. W. Ling, Observer, Weather Bureau (dated October 10, 1898).

I forward herewith a few generalizations relative to the marked pressure conditions that produce certain weather in this vicinity as deduced from a study of the daily weather maps for the past two years. The cause of the warm southwest chinook winds that prevail here is easily explained to visitors as due to mechanical or dynamic heating, and the old Japan current theory, still held by many, is easily obliterated. The conditions preceding cold waves, or colder weather, are very well marked and invariably produce the expected cold weather, with high northwest winds.

Chinook conditions.—A high over Wyoming and southern Idaho, with a low pressure over northern Montana, invariably brings to Havre a dynamic rise in temperature, i. e., a chinook wind in winter and a warmer spell of weather in summer, and accompanied by high southwest winds.

Cold wave conditions.—A low barometer over Wyoming, Utah, and southern Idaho, with high over northern Montana, Alberta, and Assiniboia, indicates intensely cold weather for Havre in winter and much cooler in summer. A high pressure area, with the low in Wyoming, by its vortical action, draws down intensely cold air from above (see journal of December 1 and 2, 1897, and of March 25, 26, 27, 1898). These conditions produce cold, high, northwest winds.

The summer type of weather conditions in Oregon, i. e., a high over Washington and Oregon with a low over the northern part of Montana and southern Alberta, indicates a warm spell for Havre and vicinity (see data July 13 to 17, 1898).

A falling barometer after a dry and warm spell of weather, barometer falling below the normal, with falling temperature, with the forecast for warm, indicates a heavy June or July rain in a day or two; also a cool atmospheric wave, followed by a warm wave (see thermograph sheet July 18 to 19, 1898, and the precipitation on those dates).

A low pressure area of 29.7, or lower, extending west to the coast and far south, indicates for Havre two or three days of rain or snow.

ANEROID BAROMETERS.

By C. F. Marvin, Professor of Meteorology (dated November 8, 1898).

The unreliability of aneroid barometers when anything like accurate measures of pressure are required is almost proverbial. It is evident that much work remains to be done in order to ascertain the laws governing the irregular action of this most convenient and, in some cases, indispensable type of barometer. It will be still better if we can ascertain and eliminate the real causes of the anomalous behavior. The face reading of an aneroid even when not compensated for temperature is often thoughtlessly accepted with every confidence as to its infallibility, but it is pretty generally understood among the more critical observers that aneroids require to be frequently checked and verified by comparison with standards, and that a slow change goes on within them after they have been subjected to a considerable change in air pressure.

It may be stated that, broadly classified, the inherent errors of all aneroids are of two kinds. When the instrument is exposed over long periods to only such pressure changes as occur at any station at the earth's surface from day to day, its error will remain sensibly constant for a considerable period of time, but from time to time relatively large changes may and generally do take place in this error without any apparent cause and can not, therefore, be duly allowed for. The other inherent error is an effect connected with any considerable change in pressure. Suppose, for example, the pressure is changed in a short space of time from 30 to 25 inches; at the instant the pressure becomes stationary the index of the aneroid will show a certain read-